Duc
W2
A2
9 Q 1-m

UNCLASSIFIED
RESTRICTED

DOCUMENT SECTION

Army Service Forces
Quartermaster Corps
CLIMATIC RESEARCH LABORATORY
Lawrence, Massachusetts

Monthly Report - 1 September 1944

1. The following reports have been sent to the Office of The Quartermaster General for the approval of Colonel G. F. Doriot:

Report No. 99 - 10 August 1944

Simplification of Clothing
Thermal Insulation, Weight, Moisture Uptake and Utility of Seven Uniform Assemblies
Seven Tables and Four Figures

Thermal insulation, moisture uptake and general utility of seven uniform assemblies were studied. They were composed of various garments plus the following Basic Items:

Underwear, 50-50
Shirt, Flannel, od.
Trousers, Field, Wool, od.
Trousers, Field, Cotton, od.
Muffler, Wool, od.
Cap, Field, Cotton, od.
Socks, Ski, 2 pair
Socks, Cushion Sole, 1 pair
Shoepacs, Type 4
Mitten Shell and Insert, Trigger-Finger, M-1943

The thermal insulation of each of the seven assemblies was compared in the Cold Room at 0°F. In addition, the thermal insulation of the two warmest assemblies was compared at minus 40°F. in relatively quiet air and at minus 20°F. with a 20 mph. wind. The clo values of the assemblies were determined in the Temperate Climate Room. With the exception of Assembly 4, which included the parka type overcoat with hood down, excellent agreement was noted between mean tolerance times and clo values. The composition, mean tolerance times at 0°F. and clo values of the seven uniform assemblies were as follows:

ARMY MEDICAL
NOV 30 1949
LIBRARY

CLASSIFICATION CHANGED
TO UNCLASSIFIED
AUTH letter QMRDW-I
DATE 12 Oct 54
SECURITY OFFICER
Frank B Rogers

UNCLASSIFIED
RESTRICTED

Assembly Number	Composition Basic Items Plus:	Mean Tolerance Time at 0°F. minutes	Clo Value
5	Overcoat, Parka Type, with Pile Liner Sweater, High Neck Jacket, Field, Wool, od.	102.6	2.7
6	Parka, Field, Pile, od. Parka, Field, Cotton, od. Sweater, High Neck	95.6	2.6
7	Parka, Field, Pile, od. Parka, Field, Cotton, od.	85.2	2.3
3	Overcoat, Parka Type, with Pile Liner (Hood up)	83.6	2.1
1	Overcoat, Wool, Melton, od. with Roll Collar Jacket, Field, Wool, od. Sweater, High Neck	81.8	2.0
2	Jacket, Field, M-1943 Jacket, Field, Wool, od. Sweater, High Neck	77.8	1.8
4	Overcoat, Parka Type, with Pile Liner (Hood down)	65.2	2.0

The comparative tolerance times for Assemblies 5 and 6, determined at minus 40°F., agreed with the results noted at 0°F. and with the clo values. No difference in the resistance of the two assemblies to a 20 mph. wind was noted at minus 20°F.

Consideration of the weights of the various assemblies and of the component items comprising them revealed the parkas to be the most efficient in thermal insulation on a weight-warmth basis. The parka type overcoat was also an efficient item, while the Overcoat, Wool, Melton provided the least comparative thermal protection.

The moisture uptake of four assemblies, each containing a different outer garment, was determined following 30-minute exposures to a heavy horizontal rain and a heavy overhead rain. The moisture gain of the wool overcoat assembly on exposure to artificial rain was excessive. On the other hand, the assemblies designed with the outer garments of cotton fabric, presumably treated for water-repellency, were relatively effective in reducing water pickup. The field jacket assembly gained more than the two hooded

assemblies, due to the entrance of water down the neck of the field jacket. This observation emphasizes the value of a water-repellent hood for soldiers exposed to rain.

The general utility of the assemblies and the individual items comprising them was determined during three field trips in maneuver areas some distance from the post, as well as during several short field tests conducted in a nearby forest during the winter of 1943-44. Consideration of the general utility of the gear led to the following conclusions:

1. The Overcoat, Parka Type, with Pile Liner, is a warm useful item, and is sufficiently neat and military in its appearance to warrant its issue to truck drivers, Signal Corps and Engineer Battalions and to other service troops exposed to subfreezing temperatures.

2. The Parka, Pile, and Parka, Cotton, od, are efficient items of clothing and are, for their weight, warmer than any other gear tested. They are not considered suitable for general use, however, as the hoods obstruct vision; the garments are difficult to put on and remove, and are difficult to ventilate during exercise. If front zippers are incorporated in these items their utility is increased without sacrifice of thermal protection. Modified or unmodified, they present a less acceptable military appearance than the other items tested.

3. The Jacket, Field, M-1943, when worn with the Sweater, High Neck, and Jacket, Field, Wool, is sufficiently warm for all but long exposures to very severe climatic conditions. The field jacket in comparison with the wool overcoat is a good rain-repellent garment; it is light in weight and presents a reasonably neat appearance. It is an ideal outer garment for combat soldiers who must be active, since it allows adequate freedom of motion. The hood for this jacket is a useful adjunct for wear in wet weather as well as in the cold.

4. The Overcoat, Wool, Melton, od, Roll Collar, is an inefficient and impractical garment for general use. It is heavy and bulky, yet is not particularly warm. It impedes the wearer and greatly restricts his activity. It has little value as a water-repellent garment. In wet weather it becomes soaked rapidly and absorbs a significant percentage of its own weight in water. When new and unwrinkled or fresh from the dry cleaners it is a smart outer garment. Following wear in the field and after it has become wrinkled and dirty, its appearance is less appealing than that of the parka overcoat under similar circumstances. Consideration should be given to making the wool overcoat a dress item only, for use within the limits of the North American Theatre.

Although each of the four outer garments has one or more commendable features, there may be unnecessary duplication in providing so many types. Consideration should be given to designing one or two items that would be suitable substitutes for all of the four garments.

Report No. 112 - 28 August 1944

Windshield, Glass Cloth, for Cookset, Mountain
Protection of Stove, Cooking, Gasoline, One-Burner, in Wind
Eight Tables and Three Figures

In order to improve the efficiency of the gasoline stove in the wind, a glass cloth windshield was devised by representatives of Research and Development Branch, OQMG, and designed to increase the caloric output of the burner according to the Test Directive by:

(1) "Protecting the flame against wind."
(2) "Protecting the gas generator against convective cooling."
(3) "Causing the hot gases from the flame to move up along the sides of the pot."
(4) "Insulating the pot itself against convective cooling."

Three original models (Types 1, 2 and 3) were studied for efficiency and durability. To these models, which varied only in the texture of the glass cloth from which they were made, a fourth cloth (Type 4) was added by this test agency. Modifications of the four basic types were made which included variations in height of the windshield, 7", 8½", 9½", 10½" and 11½", respectively, weighting of the bottom of the skirt, stiffening of the shield and variation of the number of vents. A total of fifteen types and subtypes were tested finally.

The relative efficiency of the windshield was calculated from the observations on the caloric output per minute of the burner as determined by the time necessary for the stove to heat one liter of water a given number of degrees, when used with and without the windshield. The test conditions included the Physics Laboratory, ambient temperature 80 - 85°F., still air, 3.5, 5.0 and 7.5 miles per hour wind and the Cold Room, ambient temperature plus 10°, plus 20°, plus 30° and minus 25°F., in turbulent air of less than 0.5 miles per hour, 3.5 and 7.5 miles per hour wind.

There are several factors to be considered in selecting the best windshield. It must increase the efficiency of the burner sufficiently so that the soldier will be willing to carry the extra item. It must be light of weight and compact. The fabric must be sufficiently durable so as to stand harsh treatment, stiff enough so as not to flap in a moderate wind, yet flexible enough to be stored away readily. The apparent stiffness of the fabric may be augmented by weighting the bottom of the windshield or improvising stays. Finally, there should be an optimum length and an optimum number of vents.

The study of the several types and subtypes at various temperatures and wind velocities showed that the efficiency of the one-burner gasoline stove was improved by their use. In a 7.5 mph. wind at 85°F., the

efficiency of the stove without the windshield was only 12 percent of that when the windshield was used. At subfreezing temperatures in a wind the stove was grossly inefficient without a windshield. The value of a windshield was clearly demonstrated.

The selection of the best type of windshield involved a consideration of the fabric, length of skirt and number of vents. It was concluded that the most efficient and durable shield was composed of Type 4 fabric, made by Filter Media Corporation, No. 1152. The optimum length of the skirt was found to be 10½ inches. Four vents are preferred to three. Consideration of the adoption of such a windshield was recommended.

2. In the Provisional Reports during the past month, tests on the following items were discussed:

Socks, Felt, for use with Shoepacs
Mask, Field, Pile
Overpants, Raincoat Material
Impermeable Sockgear
Bag, Waterproof, Special Purpose
Raincoat, Synthetic, Rubber Coated
Uniform, Combat, Winter
Fuels, Solid, Syphon Charger
Fuels, Solid, Self-Heating Cans
Fiber Water Content of Sleeping Gear
Footgear, Traction, Steel Deck
Shoepac, M-1944, Type 5
Footgear, Protection when Wet
Hood for Jacket, Field, M-1943
Liner for Hood for Jacket, Field, M-1943
Clo Values as a Function of Stature
Cases for Bags, Sleeping, Mountain

JOHN H. TALBOTT
Lt. Col., M. C.
Commanding